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anywhere for twenty or thirty years—at least the first time to give it a critical examination. The great rarity of the flowering of *L. polyrrhiza* is almost mysterious. Though I believe I have been enabled to throw some light on this matter, yet as I am not positive as to the correctness of my conclusions without further experiment, I refrain from printing them. — Henry Gillman, *Detroit*, *Michigan*.

ZOOLOGY.

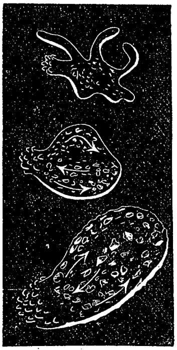
Aquaria Studies.—At the outset of the present sketch we would premise that the glass side of our aquarium which is placed next to the wall, is never cleaned, and in consequence of this, it is soon covered over with a growth of what botanists call Confervæ. The Confervæ are among the lowest forms of Algæ, a group which contains a great number of very minute microscopic plants, which have been, of late years, specially studied by microscopists. Among the lower forms of these Protophytes are the Diatomaceæ, Desmidiæ and Volvocinæ, plants of very simple organization, only lately removed from the animal kingdom. Other orders are the Palmellaceæ, likewise plants of humble type; Ulvaceæ, plants of a rather more complex character; Oscillatoriaceæ, remarkable for a peculiar kind of motion; Nostochaceæ, Siphonaceæ, and Confervaceæ.

First let us scrape some of the growth off the glass at the back of the tank, then place it in the live box with a drop of water over it, and having adjusted our microscope, what do we see?

First of all notice the vegetation contained in this drop of water. That long pointed ribbon, having the green colouring matter twisting and curling through the centre, is one of the Confervæ, a species of Spirogyra, and close beside it there is another jointed species having the chlorophyll or colouring matter in patches; this is a variety of Stigeoclonium. These are purely vegetable, and are the resort of many little creatures which revel and hide themselves among their tiny clusters of bands.

The first intruder in the field of the microscope we would call attention to is that shapeless mass near the centre. It looks like a small piece of clear jelly with little black dots or granules within. But see, it has changed its shape: it is, as it were, running out; a finger-like process is flowing out here and there; the granules also are moving. Again we look; it has now assumed a shape something like an outline of a map of Italy. While you are looking it has again changed. You ask what is that? That is one of the simplest forms of animal life; it is called the Amœba or Proteus. (Fig. 111, *Amœba diffluens* Ehr. This and the other figures illustrating this article are copied from Clark's "Mind in Nature.")

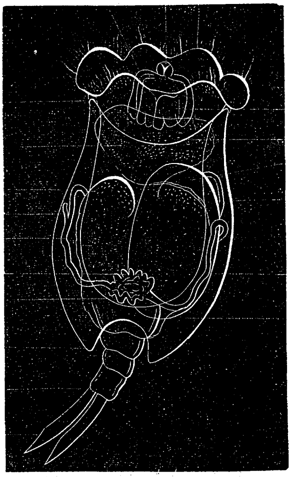
Fig. 111.



Amœba diffluens.

In the Amœba we see an animal that breathes without lungs or gills, digests without a stomach, moves without limbs, and contracts without muscles. Like other animals of simple type, which live for the most part in the deep sea, and which from the possession of root-like feet, are called Rhizopods, its body is composed of a jelly-like substance called sarcode. Some of these creatures have silicious and some calcareous shells, while others have none at all. You will ask how does the Amœba live, and how does it feed? We shall endeavor to show. Although without a nervous system, it is nevertheless very sensitive, as will be seen.

Fig. 112.



Squamella oblonga.

That other creature near it is a Rotifer or wheel-bearer. If you watch you will now see how and upon what the Amœba feeds. As its body flows and contracts, it is nearing the Rotifer which is attached by its foot to the glass, unconscious of his fate. Presently the little mass of jelly flows and touches him, but too late for the Rotifer to make his escape; as if stimulated by the contact, the Amœba has fairly covered him, and through its transparent body the Rotifer's struggles for life are perceptible. All is over with it now, the laws of absorption have so decreed it, and soon nothing will be left of it but its silicious covering. This is the way the Amœba feeds, by absorbing the juices of its victim. This creature is reproduced by fission, that is, by splitting or dividing itself into pieces, each of which becomes a perfect animal. (Fig. 112 represents a Rotifer, the *Squamella oblonga* Ehr.)

The wheel animalcule (*Rotifer vulgaris*) will be our next subject for examination. He is many degrees higher in the scale than the Amœba; his body is constructed in some degree on the principles of the tube of a telescope; he can also draw himself into a ball at pleasure; he has a mouth and jaws, which are constantly at work; his eyes are distinctly visible. When fishing he attaches himself by a foot or tail-like process either to the glass or to the stems of aquatic plants and stretches himself out, when the entrance to his mouth opens and the cilia, or hair-like appendages with which his mouth is furnished, commence moving or rushing, thus causing a current or small whirlpool in the water, by means of which monads and other animalcules are drawn in, and amongst others our friend the Amœba falls in, so that the victor of yesterday is the victim of to-day.

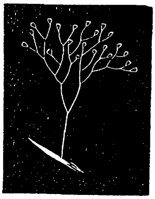
Rotifers are produced from eggs, although in one species (*Actinurus neptunius*) we have distinctly seen the young one in the body of the parent, and not only so, but have noticed its jaws going as if the creature was feeding. The red eyes of the young Actinurus could also be distinctly seen.

When swimming, the Rotifer is a very graceful creature; with his crown of cilia extended, he glides across the field of view with amazing swiftness.

We well remember when young at microscopy, the anxiety experienced to possess a Rotifer; the quantities of infusion of leaves of all sorts we made, including hay, straw and sage, but to no purpose. We could get lots of monads and other varieties, but no Rotifer. For two years this state of things went on, when we were tempted to bottle some water from one of the street puddles, taking some of the sediment with it. The bottle was placed uncorked, in the window, so that the full benefit of the sun-light might be obtained. As soon as business was over that day the bottle was produced, the animalcule cage filled, the focus of the microscope adjusted, and to our delight, the water was swarming with Rotifers; and from that day to this, we have been close companions. This water was kept for nearly three years, and fresh water now and then added to compensate for evaporation, with a little piece of pond-weed (*Anacharis alsinastrum*), or duck-weed (Lemna) to keep the water sweet. Many generations of Rotifers lived and died in that bottle, as their silicious skeletons testified, the sediment being full of them.

Temperature has very little effect on Rotifera. We have had a bottle of water containing these creatures frozen solid, and on thawing them, they were as lively as ever. We have also placed a large-sized drop of water on a slip of glass, and held it over the flame of a lamp, long enough for the glass to be uncomfortable to the fingers, with the like result. They only appeared to be a little more active after their warm bath.

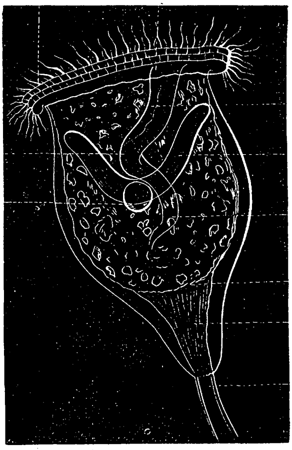
Fig. 113.



Epistylis flavicans.

The old experiment of evaporating a drop of water on a slide containing Rotifers we have also tried, and on again wetting the spot, have resuscitated some of them. We have had them the twenty-fifth to the thirtieth part of an inch in length; about the fiftieth part of an inch is the usual size.

Fig. 114.



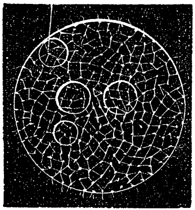
Epistylis flavicans, magnified.

A little to the left of the Rotifer, attached to a piece of Conferva, is a beautiful cluster of bell-shaped animalcules, *Vorticella campanularia.* They are attached to the plant by means of a stalk, which has a contractile muscle running from the base to the upper end: they have a ciliated mouth. Just watch that little cluster of crystal bells. They have by means of the muscle drawn back until they look like an irregular mass of gelatine. Now they slowly move out again, as if all were guided by the same will. Now they are at full stretch, with cilia revolving, fishing and feeding. Again, they are all retracted with a jerk. Some of them look as if they were double. Reproduction is going on in these: it is effected by fission. Bye-and-bye these will separate and detach themselves, and swim about till matured, when they attach themselves, to go through the same existence as their progenitors. (Fig. 113 represents a vorticellidan, *Epis-*

tylis flavicans slightly magnified; Fig. 114, the same magnified 250 diameters).

A smaller species, *Vorticella nebulifera*, is to be found attached to the bodies of some Entomostraca, as *Cyclops quadricornis*, and on *Lynceus*. Another species (*Carchesium polypinum*) is also found attached to these creatures. We have a specimen of Cyclops, mounted as a microscopic object, having *Vorticella nebulifera* attached to the back of the crustacean. The presence of the Vorticella on the slide was accidental, as the object was intended to be *Volvox globator* (Fig. 115) only. It evidently got in, either attached in some way to some of the Confervæ, or from the water.

Fig. 115.

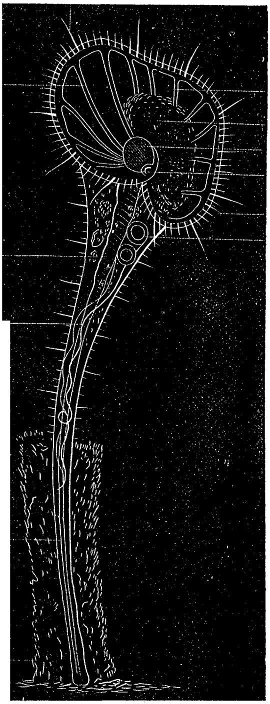


Volvox globator.

The stalks in Carchesium are not retractile; the body, however has the power of closing up by muscular action. These we have not found in numbers in our aquarium, but in the ponds near the city they are to be met with in abundance.

Another beautiful creature — the Blue Stentor (*Stentor cœruleus*) — has attached itself to a little bit of weed; its beautiful crown of cilia is expanded, and moves rapidly, creating quite a small whirlpool, into which the unfortunate monads are drawn and engulphed into its stomach. It is of a beautiful blue colour, and is found in great abundance at times on the tops of ponds, which look then as if covered with coal dust. (Fig. 116 represents *Stentor polymorphus* Ehr).

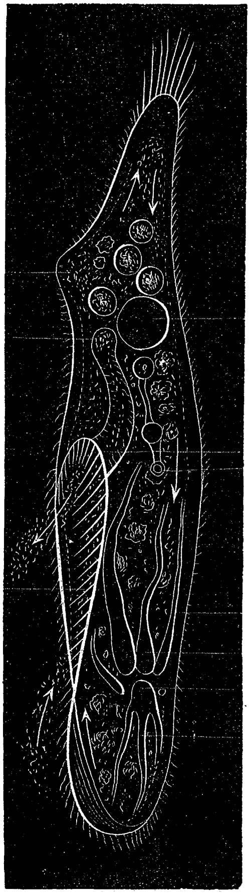
Fig. 116.



Stentor polymorphus.

On taking another drop of water from the aquarium, with more of the vegetable matter, we observe other and different creatures, resembling snakes twisting and entwining each other in their folds; these are called Lurcos or Gluttons. They are well named, for they are very voracious, feeding on animal and vegetable life; their bodies are annulose, or composed of rings having hair-like processes on each segment, which enables them to move about with considerable quickness; their mouth is capacious and ciliated; the intestinal canal is plainly seen, and their food can be well observed through their transparent bodies. We have seen them devour rotifers, monads, bell animalcules and other animals; in fact they refuse nothing. They are produced from eggs.

Fig. 117.



Paramecium caudatum.

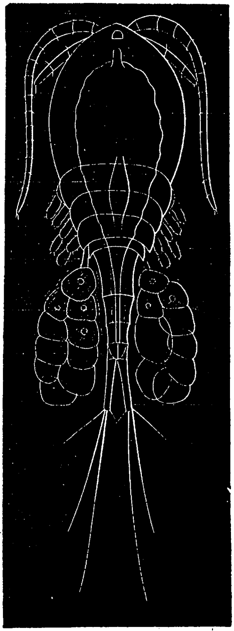
That slipper-shaped species is very common, and found in great numbers; it can be seen by the unassisted eye as a tiny speck coursing across the animalcule cage. It is called the Chrysalis animalcule (*Paramecium aurelia.*) It is ciliated all round the sides of its body, and moves about very swiftly; it is like a porpoise in a shoal of herrings—dashing here and there, devouring the smaller species, such as monads, in all directions. It undergoes many changes, and assumes many shapes during its metamorphosis; it is produced by fission as well as from the egg. (Fig. 117 represents *Paramecium caudatum* Ehr.)

That restless little fellow with four horns is *Cyclops quadricornis* (Fig. 118). The only way to get a good look at him is to bring a little pressure to bear by giving the cover of the live-box a slight squeeze so as to keep him still. He is very active, and measures about the sixteenth part of an inch in length. His head is furnished with four antennæ or horns, and the creature is provided with five pairs of feet and a long tail, which is terminated by bristles. It has in the centre of its forehead, a single red eye—hence the name Cyclops, after Vulcan's workman. The legs of the Cyclops at each of the joints, are furnished with hairs, evidently to help the creature in swimming, as is also the case with aquatic beetles. The female carries two ovaries at the extremity of the abdomen, where the eggs are hatched, and, on the young leaving these sacs, they fall off. The young, according to Carpenter, undergo five changes in their development.

Besides these little creatures we have mentioned there are many more about which much might be said.

We have monads, vibrios in great numbers, always present in the water of our aquarium: not only there we may state, but in the Montreal water this spring we detected in two instances, living vibrios in the water immediately taken from the pipe.

Fig. 118.



Cyclops guadricornis.

In concluding this sketch of the inhabitants of our aquarium the following remarks may not be out of place.

How little is known, by the great mass of mankind, of the various creations possessed with the wonderful and unknown principle, "life," respecting which much more might, perhaps, be known by means of patient microscopic research. By its aid we may learn how admirably each little organ plays its part, and how the various members contribute to each of these creatures' happiness in their struggle for life, for, for some wise purpose, every animated being, from the monad to the whale is battling for existence.

There is not, perhaps, a single species of animated being whose existence depends not, more or less, upon the death or destruction of others.

In the plan of nature death and dissolution seem to be indispensable for the support and continuance of animal life.

Man may be said, with a few exceptions, to have universal empire over the other animals. Carnivorous animals and birds are also engaged in this general work of destruction.

In fishes, also, as their habits demonstrate, from the least to the greatest, their appetite is almost insatiable, and their object in life seems to be either to devour other fishes or to avoid their own destruction.

Insects, also, are no exception to the rule. We find the same struggle going on among them, each preying on, or being preyed on by other species.

Even in our aquarium this struggle can be witnessed, as illustrated in the first part of these sketches; also among microscopic creatures, the subject of the present paper. They also have their enemies, the fish swallow them in countless thousands, while the smaller ones supply the larger ones with food.

In the economy of nature no creature lives for its own happiness alone, but by its destruction, contributes to the happiness of others. The balance of power is not entrusted to any particular class or species, and He who in wisdom made them all governs and guides the whole.—A. S. RITCHIE, *in Canadian Naturalist and Geologist.*

HYBRID BETWEEN CAT AND RACCOON.—I saw yesterday (May 2d, 1871) the most interesting hybrid animal I ever examined; and hasty as the examination was, it may be worth mentioning. Passing through Taunton, Mass., I saw in the doorway of Mr. Dunbar's bookstore what struck me, at first, as being the handsomest cat I had ever beheld. The second glance revealed an unmistakable look of wildness; and, for a moment, it seemed to me that it must be some creature of the squirrel kind, at any rate something else than a cat. On inquiry, I found it to be the offspring of a domestic cat and a tame raccoon, kept in the same family in China, Maine. I was informed that there had been several litters of these hybrids, and Mr. Dunbar had before owned one of a previous litter. That had been stolen, and he had obtained this younger one, now seven months old, from Maine.

She is larger than an average cat of that age, and is at once distinguishable both in shape and color. The color is a dark tawny, brindled with streaks that are almost black, on body and legs, and more obscurely on the tail. The under side of the body is lighter, as you will see from the matted hair which I enclose, and which was cut from the under side of one of the hind legs. (She is just now shedding her hair.) All the darker tints are quite unlike any that I ever saw in a cat. In shape she is somewhat slender, I should say, though this is concealed by the great length of the hair. The legs seem longer than a cat's, and there is something peculiar in her gait as if they were set on differently. Her walk is neither plantigrade nor yet quite feline, while it is easy and not ungraceful. I noticed no peculiarity in the paws, but the owner said she used them "unlike a cat, more like a squirrel." The head looks more triangular than a cat's, possibly, from the pointed and tufted ears, which are quite peculiar. The expression of the creature's face was so wild and formidable that I actually hesitated to touch her, but found her gentle and caressing, beyond even the habit of cats; she seemed more sympathetic and human, instead of less so, which surprised me. But the chief beauty was in the hair which I found to be very long and silken, with a softness such as I have rarely felt in any quadruped, except at a very early age. This characteristic attains its greatest perfection in the tail, which does not in the least remind one of a cat's, but is as bushy and ornamental as a squirrel's—broad, and waving and graceful. I am not well acquainted with the raccoon, though I have seen it alive; but it seems a remarkable and interesting circumstance that a hybrid should have a softness and silkiness of coat beyond that of either progenitor.

The owner has had this beautiful animal but a few weeks, and had the elder specimen of the same race but a day. He says that this one is ordinarily quite gentle and docile; but that, on one occasion, being taken up by the tail, she turned upon the aggressor with a fury far beyond that of a common cat. She also never retreats before a dog, and the dog usually retires. She feeds on milk and meat, like a cat; but has never yet caught a mouse, perhaps for want of opportunity. She is peculiarly nocturnal in her habits; is quite drowsy by day (which I also noticed) but becomes playful at night, and is always found rambling about the large shop in which she is confined.

Mr. Dunbar states that the other specimen of this breed, which he previously owned, resembled this one in color and shape, but not in the length of hair, having more resemblance in that respect to the common cat. It would be exceedingly interesting to compare the different offspring of this strange union. I was unable to ascertain which of the parents—cat or raccoon—was the female; nor could I obtain the name of the person in China, Maine, beneath whose roof these singular hybrids were produced. Possibly, you may have some correspondent in that locality who could give more accurate information. If it were possible to overcome, in this case, the ordinary infertility of hybrids, I am confident that there would be quite a demand for animals of this breed, for their beauty alone.—T. W. Higginson, *Newport, R. I.*

We give the following copy of a letter received by Mr. Higginson: —

"Dear Sir;—your favor was received on Wednesday night and Thursday morning I went over to Taunton to see the cat. It is certainly a hybrid and I am very confident Mr. Dunbar is right in believing it to be a cross of the raccoon and cat. 1st. Its tail in markings and bushiness is strongly coon, as well as the markings of its fore and hind legs and paws. 2d. Its walking gait particularly in the handling of its hind legs is purely coon. 3d. Its disposition is astonishingly wild intermingled with tame. 4th. I understood Mr. Dunbar that his brother-in-law brought the creature from China, Maine, and was assured by the man of whom he obtained it, that it was an *intentional* hybrid of the coon and cat, and not accidental, which to my mind makes it much more probable. Mr. Dunbar promised to get the name of the original owner, and also to let me have the cat to stuff, if it should happen to die. He has also sent for a male hybrid, and if he gets it will inform me. This cat will soon have kittens, and as I am frequently in Taunton, I shall follow up the enquiry with interest. Thanking you for drawing my attention to the queer specimen, and promising to give you farther information as fast as I obtain any

I am, Yours respectfully,

J. W. P. JENKS."

ORNITHOLOGICAL NOTES FROM MAINE.—Mr. G. A. Boardman of Calais, Me., writes us that he has a Florida Gallinule, *Gallinula galeata*, that was shot near Calais this last spring. Also a *black* Golden-winged Woodpecker, *Colaptes auratus*, black as a grackle and breeding with a woodpecker of the usual color. An albino of the Little Black-headed Duck, *Fulix affinis*, has also been added to his collection, and he found a pair of Red-headed Ducks, *Aythya Americana*, breeding near Calais. This is the first time he has found the Red-head in summer.

A NEW SPECIES OF ALLIGATOR.—Dr. Schulte-Buckow, who has travelled extensively in South America, gives in the New York "Zeitung" an interesting account of the habits of the alligators. He discovered a new species, which has been described by Prof. E. D. Cope under the name of *Prosuchus fuscus*.

THE DUCK HAWK.—Mr. William Jarvis of Hanover, N. H., writes us that he found the nest of a Duck Hawk on Eagle Cliff, near the Profile House, Franconia Notch, last summer. The young were able to fly from the nest, which was made of a few dry sticks placed round a slight hollow on a shelf of the cliff.